

**Remarks**

The Office Action dated May 20, 2003 and the cited references have been carefully considered. Claims 1 – 18 are pending. The Examiner rejected claims 1 – 18 under 35 U.S.C. § 103 (a) as being unpatentable over Basu et al (US patent 5,884,918, hereinafter “Basu”). The Examiner further rejected claims 1 – 18 under 35 U.S.C. § 103(a) as being unpatentable over Basu et al (US patent 5,884,918, hereinafter “Basu”).in view of Modell et al. (US patent 5,252,224, hereinafter “Modell”).

Applicants respectfully traverse these rejections of claims 1 – 18 for the reasons set forth below.

**Rejections under 35 U.S.C. § 103(a)**

**Claims 1 – 18**

**Basu**

Claim 1, 6, 11 and 16 are rejected by the Examiner under 35 U.S.C. § 103(a) as being unpatentable over Basu. According to the Examiner, it would have been obvious to one of ordinary skill in the art to select a known material on the basis of its suitability for intended use. Applicants respectfully traverse this rejection because selecting a known material on the basis of its suitability, as being an obvious design choice does not apply to this case.

It is well settled that where the claimed invention solves a problem, the discovery of the source of the problem and its solution are considered to be part of the 'invention as a whole' under 35 U.S.C. § 103. The nature of the problem 'which persisted in the art', and the inventor's solution, are factors to be considered in determining whether the invention would have been obvious to a person of ordinary skill in the art. Recognition of need and difficulties encountered by those skilled in the field are classical indicia of unobviousness. Long-felt and unmet need in the face of asserted prior art that has not provided a solution to satisfy such a need tends to negate the proposition that a combination of such prior art would have been obvious.

Moving to the invention, Applicants recite a brush seal for a steam turbine and method of retrofitting for steam turbines operating at relatively low pressures and temperatures. State of the art dictates introducing Cobalt based materials in the brush seals for power plant applications, such as Haynes, which has been the industry standard for over ten years. Such brush seals exhibit good wear performance at high temperatures and pressures, however, at low temperature and pressure conditions the wear performance of such seals (made of Haynes) suffer high degradation with time. Achieving good wear performance at low temperatures and pressures remains a challenge. Conventionally, practitioners of the art address wear performance issues through mechanical solutions by modifying the stiffness of the bristles and the like,

which can be seen, for example can be seen in the solution taught by Basu, whereas new composition solutions of the brush seal materials are typically not present in the art. Additionally, in case of nuclear power plants, the Cobalt in the brush seals absorbs neutrons and has to be treated as a radioactive waste, which is expensive and hazardous to dispose.

On the other hand, Basu merely addresses the issue of “recessed back plate” in brush seals, which causes uneven wear of the seal. Basu does not discuss the problem of diminished wear performance at low temperatures and pressures, as addressed by the Applicants.

Generally, attempts to address the problem of wear performance degradation at low temperatures and pressures have not been very successful. Further, despite the knowledge of materials such as Hastelloy, it has not been used as a brush seal material by the practitioners of the art. Additionally, as discussed, Cobalt based Haynes-25 has been an industry standard for the past at least ten years, and in the numerous tests done by the industry, and Haynes-25 has been considered the best material for brush seals in power plant applications. However, the Applicants found that Cobalt based materials are not nearly the best materials for the given low temperature and pressure ranges against the industry’s accepted and practiced norm. Further, the issue of wear performance has conventionally been addressed by mechanical innovations, such as effecting change in the flexibility of the bristles, for example, as discussed by Basu, and not by bristles made from different materials. Accordingly, since Hastelloy has never been used in the brush seal bristles to improve performance and further the wear performance issues have been addressed using mechanical methods, the Applicants submit that discovery of the suitable material for the purpose of low temperatures and pressures steam turbines does not comprise as being an obvious design choice.

In accordance with reasons set forth above, Applicants respectfully submit that claims 1, 6, 11 and 16 are patentable over Basu within scope of 35 U.S.C §103(a). Withdrawal of rejections of claims 1, 6, 11 and 16 under 35 U.S.C §103(a) is respectfully requested.

Claims 2-5, 7-10, 12-15 and 17-18 depend either directly or indirectly from independent claims 1, 6, 11 and 16 respectively, and are therefore believed to be allowable for the reasons stated above. Accordingly, withdrawal of the rejection of claims 2-5, 7-10, 12-15 and 17-18 under 35 U.S.C §103(a) is respectfully requested.

**Basu in view of Modell**

Claim 1, 6, 11 and 16 are rejected by the Examiner under 35 U.S.C. § 103(a) as being unpatentable over Basu. According to the Examiner, it would have been obvious to one of ordinary skill in the art to configure the bristle of Basu to have that the bristles are made as taught by Modell. Applicants respectfully traverse this rejection because Basu and Modell are not analogous in the art, and further there exists no teaching or suggestion in the references to make the combination.

In order to rely on a reference as a basis for rejection of an applicant's invention [under 35 U.S.C. § 103], the reference must be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned. It is immaterial to the issue of obviousness that elements of the claimed invention exist in other contexts. Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, and (2) if the reference is not in the same field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. A reference is reasonably pertinent if it is one which, because of the matter with which it deals, logically would have commended itself to the inventor's attention in considering his problem. If a reference disclosure has the same purpose as the claimed invention, the reference relates to the same problem. If it is directed to a different purpose, the inventor would accordingly have had less motivation or occasion to consider it. It is insufficient that prior art shows similar components, unless it also contains some teaching, suggestion, or incentive for arriving at the claimed structure. The Examiner may try to argue that the claimed invention may or could flow from the prior art. But that line of argument is not enough to establish obviousness. The prior art must teach or

suggest the claimed invention. That a certain thing may result from a given set of circumstances is not sufficient to establish obviousness.

Modell teaches a reactor tube cleaning brush, the brush comprising bristles made of Hastelloy, while Basu discusses the brush seals and bristles involved therein, for use in steam turbines. In discussing the cleaning brush with bristles, Modell is concerned with “removing solids collected in tubular reactor 12”, and “whereby solids which collect along tubular reactor 12 are removed periodically by directing brush 122 through the length of the tubular reactor 12” (line 8 – 14, Column 12) by these bristles. In summary, the bristles taught by Modell remove the scales / solids from the reactor walls. On the other hand, Basu and the Applicants discuss bristles in the context of brush seals for inhibiting flows along annular components, such as for example, a shaft of a steam turbine. In summary, the bristles discussed by Basu and the Applicants are effective in inhibiting pressure loss across the seals. Therefore, the purpose of bristles taught by Modell is patently distinct from the bristles taught by Basu and the Applicants and hence, Applicants submit that the reference of Modell is not analogous with the field of the invention. Further, because the teachings of Basu and Modell belong to distinct contexts, i.e. each is directed to a different purpose, there exists no motivation for the Applicants to combine the two references.

In accordance with reasons set forth above, Applicants respectfully submit that claims 1, 6, 11 and 16 are patentable over Basu in view of Modell within scope of 35 U.S.C §103(a). Withdrawal of rejections of claims 1, 6, 11 and 16 under 35 U.S.C §103(a) is respectfully requested.

Claims 2-5, 7-10, 12-15 and 17-18 depend either directly or indirectly from independent claims 1, 6, 11 and 16 respectively, and are therefore believed to be allowable for the reasons stated above. Accordingly, withdrawal of the rejection of claims 2-5, 7-10, 12-15 and 17-18 under 35 U.S.C §103(a) is respectfully requested.

### **Conclusion**

In view of the remarks set forth above, allowance of the pending claims is respectfully requested. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned as the telephone number listed below.

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Respectfully submitted,

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